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Supplement to AN ANNOTATED LIST AND BIBLIOGRAPHY OF INSECTS REPORTED TO HAVE VIRUS DISEASES¹

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IN 1957 HUGHES (166) laid the basis for the "Annotated List and Bibliography" by cataloguing a series of 259 papers dealing with virus infections of insects. While Hughes' list contains most of the important papers published on insect viruses and virus diseases, it does not include many reports which, even if not dealing primarily with virology or pathology, nonetheless contain valuable information for the insect pathologist. This first supplement adds 473 new references to the 259 already published in Hughes' list. Almost all these papers have been seen in the original or, in a few cases, in photostatic copy of the original (as we are quite adverse to the not uncommon practice of quoting from quotations, thus perpetuating errors). Where the linguistic knowledge of the authors was lacking, translators were consulted; in some cases complete translations were available with the original publication.

The present supplement, as in the list by Hughes, includes only a small proportion of the many papers in Japanese or Russian: those included were available in translation or contained a summary complete enough to derive sufficient information on the type of disease concerned. It is gratifying to know that a similar bibliographical survey is being completed at present in the U.S.S.R. (S. Gershenson, personal communication, 1958).

Titles of Japanese and Russian papers appear in translation only, the translation being that given in the summary of the original publication. Papers in English, French, German, and Italian are entered with their original titles and without translations. Translations and original titles appear for papers in Czech, Polish, and Croatian.

As in Hughes' list, an attempt was made to distinguish between nuclear polyhedrosis and cytoplasmic polyhedrosis whenever the information available permitted such a distinction. Those cases in which a polyhedrosis was involved, but without evidence to indicate the type of polyhedrosis, were recorded simply as "polyhedrosis."

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The sources for scientific and common names are the same as in Hughes' list. The only addition is the work "The North American sawflies of the genera *Acantholyda*, *Cephalcia*, and *Neurotoma* (Hymenoptera, Pamphiliidae)" by W. W. Middlekauff (Univ. Calif. Publ. Ent. **14**:51-173; 1957), on which basis the generic name *Cephalcia* was adopted in place of *Cephaleia*.

The families are arranged alphabetically within the orders. Subgeneric names, where necessary, are in parentheses, after the generic name. In addition to the host list, a general list of references is included in this supplement. Abbreviations of periodicals are those of the "World List of Scientific Periodicals Published in the Years 1900-1950" edited by W. A. Smith, F. L. Kent, and G. B. Stratton (3d ed., Butterworths Scientific Publications, London, xvii-1058 pp.; 1952).

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HOST LIST

ARACHNIDA ACARINA

"Seta-suppressor substance" (72)

TETRANYCHIDAE

Tetranychus cinnabarinus (Bdv.)

INSECTA LEPIDOPTERA

AGROTIDAE

(See PHALAENIDAE)

ANTHELIDAE

Pterolocera amplicornis Wlk.

Nuclear polyhedrosis (93, 327)

ANTHROCERIDAE

(See ZYGAEINIDAE)

ARCTIIDAE

Apantesis virgo (L.)

Polyhedrosis (137)

Arctia caja (L.), great tiger moth

Nuclear polyhedrosis (324, 336)

Cytoplasmic polyhedrosis (124, 329, 336, 383)

Polyhedrosis (412)

Arctia villica (L.), cream-spot tiger moth

Cytoplasmic polyhedrosis (47, 48, 124, 327, 336)

Ardices glatignyi (Le Guill.), woolly bear

Nuclear polyhedrosis (364)

Cycnia mendica (Clerck), muslin moth

Nuclear polyhedrosis (336)

Diacrisia purpurata (L.)

Cytoplasmic polyhedrosis (336)

Estigmene acrea (Drury), salt-marsh caterpillar

Granulosis (47, 74)

Euplagia quadripunctaria (Poda), Jersey tiger moth

Cytoplasmic polyhedrosis (336)

Hyphantria cunea (Drury), fall webworm

Nuclear polyhedrosis (212, 234, 235, 350)

Cytoplasmic polyhedrosis (389)

Polyhedrosis (194, 231)

Granulosis (196, 314)

Hypocrita jacobaeae (L.), cinnabar moth

Nuclear polyhedrosis (336)

Panaxia dominula (L.), scarlet tiger moth

Nuclear polyhedrosis (323, 327, 336, 411, 414)

Phragmatobia fuliginosa (L.), ruby tiger moth

Cytoplasmic polyhedrosis (336)

BOMBYCIDAE

Bombyx mori (L.), silkworm

Nuclear polyhedrosis (3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 30, 32, 33, 34, 35, 38, 43, 45, 47, 48, 50, 51, 52, 57, 70, 71, 74, 77, 80, 83, 90, 91, 94, 95, 99, 100, 104, 105, 107, 108, 111, 112, 113, 116, 133, 134, 135, 137, 139, 144, 145, 146, 147, 155, 162, 163, 165, 169, 171, 173, 175, 176, 177, 179, 185, 187, 197, 198, 199, 202, 203, 208, 213, 215, 217, 219, 220, 222, 229, 232, 233, 236, 237, 242, 243, 244, 245, 246, 247, 248, 249, 253, 256, 263, 264, 266, 267, 268, 271, 273, 276, 278, 280, 283, 284, 285, 286, 287, 288, 293, 296, 297, 302, 303, 305, 306, 308, 316, 317, 324, 326, 327, 338, 339, 354, 355, 356, 360, 361, 362, 363, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 387, 393, 396, 398, 401, 402, 403, 408, 410, 414, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473) [Papers 424 and 473 refer to hybrids of *Theophila mandarina* and *Bombyx mori*]

Cytoplasmic polyhedrosis (21, 32, 33, 34, 35, 36, 37, 171, 172, 173, 327, 336)

A poorly defined group of diseases, including those known as flacherie and gattine, believed by Paillot to result from infection by a virus and a bacterium (100, 242, 244, 269, 270, 271, 272, 274, 275, 276, 277, 278, 279, 280, 282, 376)

Theophila mandarina Moore, mulberry wild silkworm

Nuclear polyhedrosis (32, 424, 462, 473) [Papers 424 and 473 refer to hybrids of *Theophila mandarina* and *Bombyx mori*]

Cytoplasmic polyhedrosis (32)

DIOPTIDAE

Phryganidia californica Paek., California oakworm

Nuclear polyhedrosis (47, 74, 137, 159, 170, 341)

DREPANIDAE

Drepana lacertinaria (L.)

Cytoplasmic polyhedrosis (329)

GALLERIIDAE

Galleria mellonella (L.), greater wax moth

Nuclear polyhedrosis (383)

"*Galleria*-adapted silkworm jaundice virus" (21)

GELECHIIDAE

Recurvaria milleri Busck, Lodgepole needle miner

Granulosis (347)

GEOMETRIDAE

Abraxas grossulariata (L.), currant moth

Nuclear polyhedrosis (323, 324, 327, 414)

Cytoplasmic polyhedrosis (327)

Alsophila pometaria (Harr.), fall cankerworm

Cytoplasmic polyhedrosis (255)

Bupalus piniarius (L.)

Cytoplasmic polyhedrosis (325, 328)

Polyhedrosis (109, 181)

Unidentified particles in blood resembling virus inclusion bodies (327)

Crocallis elingvaria (L.)

Cytoplasmic polyhedrosis (336)

Ennomos quercinaria (Hfn.)

Nuclear polyhedrosis (168)

Eulype hastata (L.), spear-marked black moth

Granulosis (343)

Hibernia defoliaria (L.)

Nuclear polyhedrosis (124, 205, 207)

Lambdina fiscellaria fiscellaria (Guen.), hemlock looper

Polyhedrosis (301)

Lambdina fiscellaria lugubrosa (Hulst), western hemlock looper

Nuclear polyhedrosis (291, 310)

Operophtera brumata (L.), winter moth

Nuclear polyhedrosis (330)

Cytoplasmic polyhedrosis (255, 325, 328, 330)

Oporinia autumnata (Borkh.), larch looper

Nuclear polyhedrosis (124)

Ourapteryx sambucaria (L.), swallow tailed moth

Cytoplasmic polyhedrosis (336)

Sabulodes caberata Guen., omnivorous looper

Granulosis (47, 327)

LASIOCAMPIDAE

Dendrolimus pini L.

Polyhedrosis (135)

Malacosoma americanum (F.), eastern tent caterpillar

Nuclear polyhedrosis (86, 136, 215, 402, 408)

Polyhedrosis (137)

Malacosoma californicum (Pack.), California tent caterpillar

Nuclear polyhedrosis (86, 218)

Malacosoma constrictum (Stretch)

Nuclear polyhedrosis (86, 218)

Malacosoma disstria Hbn., forest tent caterpillar

Nuclear polyhedrosis (51, 80, 86, 215, 291, 340, 365, 402)

Polyhedrosis (137, 320)

Malacosoma fragile (Stretch), Great Basin tent caterpillar

Nuclear polyhedrosis (86, 340)

Malacosoma neustria (L.)

Nuclear polyhedrosis (59, 124, 195)

Polyhedrosis (135, 152, 161, 193, 194)

Malacosoma pluviale (Dyar), western tent caterpillar

Nuclear polyhedrosis (309)

LIMACODIDAE

Natada nararia (Moore), nettle grub of tea

Granulosis (167, 325, 326, 327, 328)

LYCAENIDAE

Lycaena phlaeas (L.), small copper butterfly

Cytoplasmic polyhedrosis (336)

LYMANTRIIDAE

Dasychira pudibunda (L.)

Cytoplasmic polyhedrosis (124, 206, 208, 214, 317)

Polyhedrosis (110)

Euproctis chrysorrhoea (L.), brown-tail moth

Nuclear polyhedrosis (124, 205)

Polyhedrosis (114, 151, 193, 194)

Euproctis flava (Bremer)

Nuclear polyhedrosis (20)

Euproctis pseudoconspersa (Strand)

Nuclear polyhedrosis (20)

Hemerocampa leucostigma (J. E. Smith), white-marked tussock moth

Nuclear polyhedrosis (142, 143)

Polyhedrosis (137)

Hemerocampa pseudotsugata McD., Douglas-fir tussock moth

Polyhedrosis (291, 311)

Ivela auripes (Butler), yellow-legged tussock moth

Nuclear polyhedrosis (32)

Lymantria monacha (L.), nun moth

Nuclear polyhedrosis (47, 57, 74, 76, 77, 103, 124, 137, 160, 182, 184, 185, 186, 189, 192, 242, 263, 280, 303, 304, 306, 312, 316, 327, 336, 414)

Cytoplasmic polyhedrosis (164)

Polyhedrosis (45, 106, 107, 108, 114, 132, 138, 141, 161, 191, 257, 292, 295, 298, 307, 366, 367, 394, 395)

Virus disease, not further identified (160)

Porthetria dispar (L.), gypsy moth

Nuclear polyhedrosis (47, 48, 51, 57, 74, 77, 124, 136, 137, 139, 183, 185, 215, 229, 242, 250, 263, 280, 306, 316, 317, 322, 325, 327, 336, 365, 378, 383, 390, 391, 397, 401, 402, 408, 414)

Cytoplasmic polyhedrosis (336, 392)

Polyhedrosis (22, 44, 45, 106, 107, 108, 114, 135, 138, 187, 193, 194, 195, 196, 298, 299, 313, 338)

Stilpnotia salicis (L.) satin moth

Nuclear polyhedrosis (124, 401)

NOCTUIDAE

(See PHALAEENIDAE)

NOTODONTIDAE

Cerura hermelinea (Goeze)

Nuclear polyhedrosis (276)

Cerura vinula (L.), puss moth

Cytoplasmic polyhedrosis (336)

Phalera bucephala (L.), buff tip moth

Nuclear polyhedrosis (336)

Cytoplasmic polyhedrosis (329, 336)

NYMPHALIDAE

Aglais urticae (L.), small tortoiseshell butterfly

Nuclear polyhedrosis (74, 336)

Cytoplasmic polyhedrosis (325)

Polyhedrosis (135)

Junonia coenia Hbn., buckeye

Nuclear polyhedrosis (339)

Granulosis (47, 74, 339, 341)

Nymphalis io (L.), peacock butterfly

Nuclear polyhedrosis (336)

Polyhedrosis (135)

Vanessa atalanta (L.), red-admiral

Polyhedrosis (135)

Vanessa cardui (L.), painted lady butterfly

Nuclear polyhedrosis (41, 256, 325, 328, 330, 336)

Cytoplasmic polyhedrosis (41, 256, 325, 328, 330, 336)

Polyhedrosis (135, 328)

OLETHREUTIDAE

Eucosma griseana (Hbn.), gray larch tortrix, larch bud moth

Polyhedrosis; viral nature of polyhedra not yet established (174, 176, 179, 180, 203)

Granulosis (42, 68, 73, 124, 180, 239, 241)

PAPILIONIDAE

Papilio machaon L.

Cytoplasmic polyhedrosis (329)

PHALAEENIDAE

Agrotis segetum (Schiff.), turnipmoth or cutworm

Nuclear polyhedrosis (74, 281)

Cytoplasmic polyhedrosis (330)

Granulosis (74)

Diataraxia oleracea (L.), tomato moth

Cytoplasmic polyhedrosis (330)

Euxoa ochrogaster (Guen.), red-backed cutworm

Granulosis (343)

Heliothis virescens (F.), tobacco budworm

Nuclear polyhedrosis (84)

Heliothis zea (Boddie), corn earworm, bollworm, tomato fruitworm

Nuclear polyhedrosis (56, 334)

Lampra fimbriata (von Schreber), broad-bordered yellow underwing

Cytoplasmic polyhedrosis (336)

Melanchra persicariae (L.), dot moth

Granulosis (329, 330)

Panolis flammea Schiff., pine moth

Polyhedrosis (109)

Peridroma margaritosa (Haw.), variegated cutworm

Nuclear polyhedrosis (339)

Granulosis (47, 74, 167, 327, 337, 339, 341)

Phlogophora meticulosa (L.), angleshades moth

Nuclear polyhedrosis (336, 414)

Cytoplasmic polyhedrosis (325, 326, 327, 336)

Plusia gamma (L.)

Nuclear polyhedrosis (59, 386)

Prodenia "litosia" [This is probably *Prodenia litura* (F.)]

Polyhedrosis (108)

Prodenia litura (F.), cotton leafworm

Nuclear polyhedrosis (2, 54)

Prodenia praefica Grote, western yellow-striped armyworm

Nuclear polyhedrosis (1, 2, 47, 74, 229)

Pseudaletia unipuncta (Haw.), armyworm

Nuclear polyhedrosis (25, 75, 115, 137, 238)

Noninclusion virus disease (327, 330)

Spaelotis clandestina (Harr.), W-marked cutworm

Polyhedrosis (137)

Spodoptera mauritia (Bdv.), lawn armyworm

Nuclear polyhedrosis (58, 353)

Trichoplusia ni (Hbn.), cabbage looper

Nuclear polyhedrosis (137, 157, 230, 318)

Triphaena pronuba (L.), yellow underwing

Cytoplasmic polyhedrosis (330)

PHALONIIDAE

Clysiana ambiguella (Hbn.)

Polyhedrosis (108)

PHYCITIDAE

Ephestia cautella (Wlk.), almond moth

Nuclear polyhedrosis (414)

PIERIDAE

Aporia crataegi (L.), black-veined white butterfly

Nuclear polyhedrosis (124, 206, 208, 209, 211, 212, 317)

Polyhedrosis (135, 346)

Colias philodice eurytheme Bdv., alfalfa caterpillar

Nuclear polyhedrosis (1, 25, 47, 74, 80, 85, 87, 88, 154, 215, 294, 325, 340, 341, 342, 344, 345, 348, 358, 359, 402, 408, 409)

Colias philodice philodice Latr., clouded sulphur butterfly

Polyhedrosis (137)

Pieris brassicae (L.), European cabbage butterfly

Granulosis (60, 74, 148, 212, 242, 276, 280, 330, 340)

Possible virus disease with formation of polymorphic inclusion bodies (74, 242, 265, 276, 280, 287)

Pieris napi (L.), mustard white

Granulosis (330)

Pieris rapae (L.), imported cabbageworm

Polyhedrosis (137)

Granulosis (68, 327, 330, 340, 351)

Virus disease, not further identified (300)

PSYCHIDAE

Cryptothoele junodi (Heylaerts), wattle bagworm

Nuclear polyhedrosis (258, 259, 260, 261, 262, 321)

SATURNIIDAE

Antheraea paphia mylitta (Drury)

Cytoplasmic polyhedrosis (331)

Antheraea pernyi Guér.-Men., Chinese oak silkworm

Polyhedrosis (135, 293)

Antheraea polyphemus (Cram.), polyphemus moth

Nuclear polyhedrosis (323, 324, 336)

Hemileuca maia (Drury), buck moth

Polyhedrosis (137)

Samia cynthia (Drury), Cynthia moth

Nuclear polyhedrosis (325, 336)

Cytoplasmic polyhedrosis (336)

Polyhedrosis (293)

Samia ricini (Bdv.), Arrindy silkorm

Nuclear polyhedrosis (32, 188, 336)

Saturnia pyri (Schiff.)

Nuclear polyhedrosis (276)

SATYRIDAE

Dira megera (L.), wall butterfly

Cytoplasmic polyhedrosis (336)

Pararge aegeria (L.), speckled wood butterfly

Cytoplasmic polyhedrosis (336)

SELIDOSEMIDAE

(See GEOMETRIDAE)

SPHINGIDAE

Celerio euphorbiae (L.), spurge hawk moth

Polyhedrosis (412)

Laothoe populi (L.), poplar hawk moth

Nuclear polyhedrosis (336)

Cytoplasmic polyhedrosis (317, 415)

Smerinthus ocellata atlanticus Austaut

Polyhedrosis (108)

Sphinx ligustri L., privet hawk moth

Nuclear polyhedrosis (336)

Cytoplasmic polyhedrosis (331, 336)

THAUMETOPOEIDAE

Thaumetopoea pityocampa Schiff.

Nuclear polyhedrosis (59, 61, 149, 376, 388)

Cytoplasmic polyhedrosis (61, 317, 385, 415)

TINEIDAE

Tinea pellionella (L.), casemaking clothes moth

Nuclear polyhedrosis (325, 336)

Cytoplasmic polyhedrosis (325, 336)

Tineola bisselliella (Hum.), webbing clothes moth

Nuclear polyhedrosis (323, 325, 383)

Cytoplasmic polyhedrosis (323, 325)

Polyhedrosis (27, 403)

TORTRICIDAE

(See also OLETHREUTIDAE and PHALONIIDAE)

Acleris variana (Fern.), black-headed budworm

Nuclear polyhedrosis (291)

Argyrotaenia velutinana (Wlk.), red-banded leaf roller

Granulosis (47, 140, 315, 319, 327)

Cacoecia murinana (Hbn.), fir shoot roller

Nuclear polyhedrosis (82, 216)

Granulosis (47, 48, 74, 79, 82, 124, 215, 229, 306, 316, 327, 402, 407, 408)

Choristoneura fumiferana (Clem.), spruce budworm

Nuclear polyhedrosis (47, 48, 62, 80, 215, 229, 252, 291, 402)

Cytoplasmic polyhedrosis (254)

Granulosis (48, 68, 81, 215, 229, 252)

ZYGAENIDAE

Harrisina brillians B. & McD., western grape leaf skeletonizer

Granulosis (88, 156)

COLEOPTERA

SCARABAEIDAE

Melolontha hippocastani L.

Virus disease, not further identified (160)

Melolontha melolontha L.

Virus disease, not further identified (160)

HYMENOPTERA

APIDAE

Apis mellifera L., honey bee

"Paralysis," a noninclusion virus disease (251, 330)

Sacbrood, a noninclusion virus disease (74, 131, 137, 242, 330)

Pathogenic drone brood, a possible virus disease of the queen bee, with inclusion bodies (127, 128, 129, 130)

Diprion (Gilpinia) hercyniae (Hartig), European spruce sawfly

Nuclear polyhedrosis (39, 40, 41, 52, 64, 65, 66, 69, 81, 96, 117, 120, 124, 291, 327, 340, 348, 357)

Neodiprion lecontei (Fitch) red-headed pine sawfly

Nuclear polyhedrosis (66, 291)

Neodiprion pratti banksianae Roh., jack-pine sawfly

Nuclear polyhedrosis (66, 67, 291, 340)

Neodiprion pratti pratti (Dyar)

Polyhedrosis (44, 97)

Neodiprion sertifer (Geoff.), European pine sawfly

Nuclear polyhedrosis (25, 39, 41, 44, 63, 64, 66, 81, 97, 98, 117, 118, 119, 120, 121, 123, 124, 125, 126, 200, 201, 204, 208, 210, 291, 294, 325, 327, 340, 348, 357, 402, 408)

Polyhedrosis (107, 108, 110)

PAMPHILIIDAE

Acantholyda (Itycorsia) nemoralis C. G. Thomson

Virus disease, not further identified (160)

Cephalcia (Cephalcia) abietis L.

Polyhedrosis; viral nature of polyhedra not yet established (175, 176, 203, 207)

TENTHREDINIDAE

- Nematus olfaciens* Benson, black currant sawfly
Nuclear polyhedrosis (325)

DIPTERA

CHIRONOMIDAE

- (See TENDIPEDIDAE)

CULICIDAE

- Anopheles subpictus* Grassi
A possible virus disease with inclusion bodies (92)

DROSOPHILIDAE

- Drosophila melanogaster* Meig.
Virus "σ" (78, 101, 102, 150, 221, 223, 224, 225, 226, 227, 228, 289, 290)

TENDIPEDIDAE

- Chironomus tentans* F.
A possible virus disease with inclusion bodies (158, 399)

TIPULIDAE

- Tipula (Tipula) paludosa* Meig., leatherjacket
Nuclear polyhedrosis (31, 325, 326, 327, 328, 329, 330, 335)
Tipula iridescent virus (31, 190, 317, 325, 327, 328, 329, 330, 331, 332, 333, 335, 405, 406)

SUBJECT LIST

Included in this section are reviews on insect viruses as well as papers concerned primarily with the biological, biophysical, and biochemical properties of insect viruses as a group. A large number of these papers are listed also with certain hosts, if the information seems of interest for a particular virus-host system. Since reviews on insect viruses (*e.g.*, 53) usually mention a large number of hosts from the literature, without adding new information, they have not been listed in the host catalogue.

VIRUSES, INCLUDING THOSE OF INSECTS (Reviews)

24, 229, 306, 316, 317, 326, 328

INSECT VIRUSES ONLY (Reviews)

46, 51, 53, 137, 178, 242, 276, 280, 292

TAXONOMY AND NOMENCLATURE

23, 47, 74, 400

MORPHOLOGY AND DEVELOPMENT

48, 49, 306, 326, 327, 404, 413

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52, 324, 339, 341, 383, 421

MICROBIAL CONTROL

25, 28, 29, 80, 87, 88, 109, 153, 193, 330, 340, 342, 349, 352

METHODS AND TECHNIQUES

26, 55, 76, 203, 212, 216, 217, 239, 240, 371, 375, 381

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53, 89, 122, 166, 242

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